

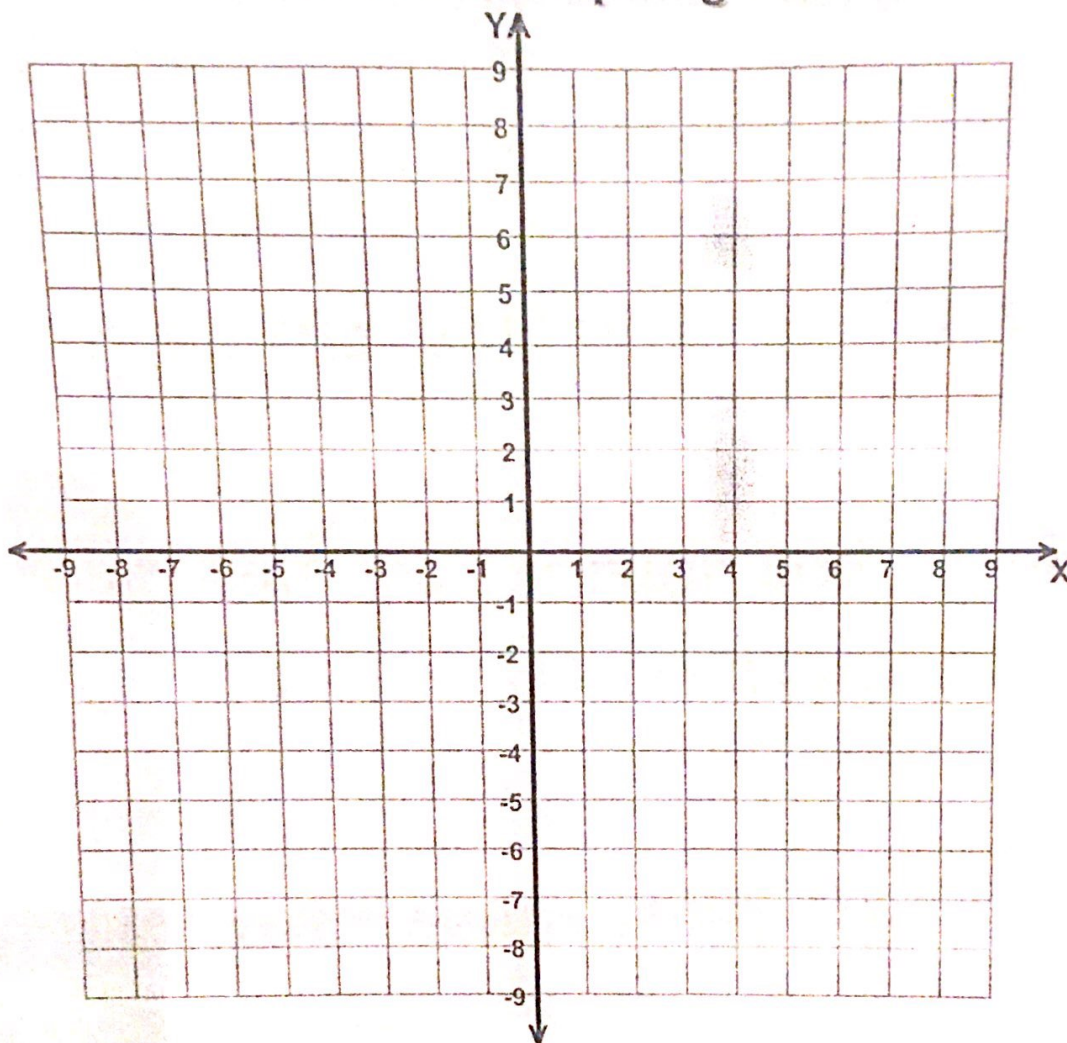
Name : _____

Score : _____

Teacher : _____

Date : _____

Four Quadrant Graphing Puzzle



Connect each sequence of points with a line.

$(8,7)$, $(7,3)$, $(5,1)$, $(1,-3)$, $(-1,-5)$, $(-2.5,-4.5)$, $(-3.5,-3.5)$, $(-4,-2)$, $(-2,0)$, $(2,4)$, $(4,6)$, $(8,7)$ End of Sequence

$(-3.5,-3.5)$, $(-4,-4)$, $(-5,-4)$, $(-5,-5)$, $(-4,-6)$, $(-3,-6)$, $(-3,-5)$, $(-2.5,-4.5)$ End of Sequence

$(-5,-4)$, $(-8,-6)$, $(-6,-6)$, $(-8,-9)$, $(-5,-7)$, $(-5,-9)$, $(-3,-6)$ End of Sequence

$(4,6)$, $(5,4)$, $(7,3)$ End of Sequence

$(2,4)$, $(3,2)$, $(5,1)$ End of Sequence

$(0,2)$, $(1,0)$, $(3,-1)$ End of Sequence

$(-2,0)$, $(-1,-2)$, $(1,-3)$ End of Sequence

What is the shape ? _____



Directions for Finding MAX and MIN values on the calculator

STEP 1- Enter the function in Y1 in your calculator

STEP 2: GRAPH the function and determine if it has a MAX (HILL) or a MIN (VALLEY)

STEP 3: Press 2nd TRACE (MIN(3) or MAX(4))

STEP 4: Move the cursor (with the arrow keys,) to the left of the max/min and press ENTER

STEP 5: Move the cursor (with the arrow keys,) to the right of the max/min and press ENTER

STEP 6: Hit ENTER and you will see the point for the max and min $x =$, $y =$

THE "X" IS THE TIME AND THE "Y" IS THE HEIGHT

Foundations Quadratics and Exponentials Test

Name _____

(QUADRATICS $f(x) = AX^2 + BX + C$) MAX/MIN PT $(\frac{-B}{2A}, f(\frac{-B}{2A}))$

I. For the following quadratic equations find the zeroes, max/min points. (Remember they are all points and should all have (x,y) values)

a.) $y = x^2 + 7x + 12$ Zero # 1 _____ Zero #2 _____ Max/Min pt _____

b.) $y = x^2 + 7x + 6$ Zero # 1 _____ Zero #2 _____ Max/Min pt _____

c.) $y = (x + 2)(x - 8)$ Zero # 1 _____ Zero #2 _____ Max/Min pt _____

d.) $y = (x-4)(x-5)$ Zero # 1 _____ Zero #2 _____ Max/Min pt _____

e.) $y = x^2 - 7x + 12$ Zero # 1 _____ Zero #2 _____ Max/Min pt _____

II.

1. Solve: $2x^2 + 18x - 44 = 0$ (Hint same as finding the zeroes)

2. You are hiking in the mountains. You want to climb to a ledge that is 20 feet above you. The height your hook can be thrown is given by the function $h = -16t^2 - 32t + 20$. What is the **maximum height** the hook can reach?

3. You are trying to dunk a basketball. You need to jump 2.5 feet in the air to dunk the ball. The height that your feet are above the ground is given by the function $h = -16t^2 + 14t$. What is the **maximum height** your feet will be above the ground?

Quadratic Equations & Exponential Functions

Goal 4.02 & 4.04

- Matt's height in feet above the water x seconds after he dives from a diving board into a swimming pool can be modeled by the function $y = -4.9x^2 + 3.5x + 15$. What is the height of the diving board?
 - 2 ft.
 - 2.3 ft.
 - 15 ft.
 - 15.8 ft.
- A television manufacturing company observes that the expected profit for producing t televisions, $p(t)$, is a function of the number of televisions produced, as given by the equation $p(t) = t^2 + 5t - 6$. What is the expected profit for producing 200 televisions?
 - \$40,994
 - \$40,199
 - \$39,999
 - \$1,394
- A bird builds a nest on the sill of a second story office building window. During a storm, an egg falls out of the nest. The height of the egg in feet above the sidewalk x seconds after the fall can be modeled by the function $y = -16x^2 + 20$. What was the height of the nest above the sidewalk?
 - 4 ft.
 - 16 ft.
 - 20 ft.
 - 36 ft.
- The total profit made by a company given by the function $p = x^2 - 25x + 5,000$. What is the approximate minimum profit made by the company?
 - \$5,000
 - \$4,975
 - \$4,974
 - \$4,844
- You are hiking in the mountains. You want to climb to a ledge that is 20 feet above you. The height your hook can be thrown is given by the function $h = -16t^2 - 32t + 5$. What is the maximum height the hook can reach?
 - 21 ft.
 - 5 ft.
 - 1 ft.
 - 43 ft.
- You are trying to dunk a basketball. You need to jump 2.5 feet in the air to dunk the ball. The height that your feet are above the ground is given by the function $h = -16t^2 + 12t$. What is the maximum height your feet will be above the ground?
 - 28 ft.
 - 4 ft.
 - 2.25 ft.
 - 0.37 ft.

11. An investment is growing at a rate of 8% each year and now has a value of \$10,000. What is the value of the investment in five years, to the nearest dollar?

12. Mark buys a new car for \$35,000. If it depreciates in value 10% each year, what will the car be worth in 8 years. Round your answer to the nearest cent.

13. Which formula below would be used to find the value of stock that increased at a rate of 4.5% each year?

A. $A = P(.045)^t$

B. $A = P(4.5)^t$

C. $A = P(1.045)^t$

D. $A = P(1.45)^t$

14. . A boat is purchased for \$28,000 and depreciates at a rate of 13.5% each year. What will be the approximate worth of the boat in 5 years?

Write a scenario in which you purchased or invested in an item (house, car, ect,) Provide the exponential function that best represents your scenario. Give the value of your investment after 5 years. (don't forget to include your interest rate in your scenario)

Scenario:

Equation:

Value after 5 years:

4. A diver is standing on a platform 20 ft. above the pool. He jumps from the platform with an initial upward velocity, of 8 feet per second. Use the formula $h = -16t^2 + vt + s$, where h is his height above the water, t is the time, v is his starting upward velocity, and s is his starting height. How long will it take for him to hit the water?

5. The equation $h = -16t^2 + 58t + 5$ models the height of a baseball t seconds after it has been hit. How long will it approximately take for the ball to hit the ground?

6. Brandon found that his sales at his Italian Ice stand can be modeled by the equation $T = -m^2 + 12m + 3500$ where T is his total sales in hundreds and m is the month. What is the largest amount of money Brandon makes in a month?

EXPONENTIAL FUNCTIONS $F(x) = P(1 \pm R)^T$

For each function give the initial amount and rate. State if the problem is a CAR or HOUSE problem.

7. $f(x) = 4000(1.03)^t$ Initial amount _____ rate _____ % HOUSE OR CAR (CIRCLE ONE)
 What is the value after 12 years? _____

8. $f(x) = 200(1.2)^t$ Initial amount _____ rate _____ % HOUSE OR CAR (CIRCLE ONE)
 What is the value after 3 years? _____

9. $f(x) = 500(.93)^t$ Initial amount _____ rate _____ % HOUSE OR CAR (CIRCLE ONE)
 What is the value after 5 years? _____

10. $f(x) = 22000(.84)^t$ Initial amount _____ rate _____ % HOUSE OR CAR (CIRCLE ONE)
 What is the value after 6 years? _____

Quadratic Equations & Exponential Functions

Goal 4.02 & 4.04

7. A diver is standing on a platform 24 feet above the pool. He jumps from the platform with an initial upward velocity of 8 feet per second. Use the formula $h = -16t^2 + vt + s$, where h is his height above the water, t is the time, v is his starting upward velocity, and s is his starting height. How long will it take for him to hit the water?
- A. 1.5 seconds
B. 3 seconds
C. 16 seconds
D. 32 seconds
8. A ball is thrown upward from a height of 15 feet with an initial upward velocity of 5 feet per second. Use the formula $h = -16t^2 + vt + s$ to find approximately how long it will take for the ball to hit the ground.
- A. 20 seconds
B. 15 seconds
C. 10 seconds
D. 1.25 seconds
9. The equation $h = -16t^2 + 58t + 3$ models the height of a baseball t seconds after it has been hit. How long will it approximately take for the ball to hit the ground?
- A. -0.5 seconds
B. 1.8 seconds
C. 3 seconds
D. 3.68 seconds
10. Brandon found that his sales at his snow cone stand can be modeled by the equation $T = -m^2 + 12m + 3564$ where T is this total sales in hundreds and m is the month. What is the largest amount of money Brandon makes in a month?
- A. \$360
B. \$600
C. \$3,600
D. \$6,000
11. Geena is diving off a 3-meter springboard. Her height h in meters above the water when she is x meters horizontally from the end of the board is given by the equation $h = -x^2 + 3x + 3$. Use a graph to find how far out from the end of the board Geena is when she is 1.25 meters from the water.
- A. 2.75 meters
B. 3 meters
C. 3.5 meters
D. 4 meters
12. The height h in feet of a certain rocket t seconds after its launch is given by the formula $h = -16t^2 + 2,320t + 125$. Use a graph to determine about how many seconds it will take for the rocket to reach its maximum height of 84,225 feet.
- A. 1 second
B. 36.25 seconds
C. 7.25 seconds
D. 72.5 seconds

Quadratic Equations & Exponential Functions

Goal 4.02 & 4.04

13. An investment is growing at a rate of 6% each year and now has a value of \$10,000. What is the value of the investment in five years, to the nearest dollar?
- A. \$104,857.60
B. \$13,382
C. \$7,339
D. \$7,340
14. Mark buys a nice car for \$30,000. If it depreciates in value 10% each year, what will the car be worth in 8 years? Round your answer to the nearest cent.
- A. \$64,307.66
B. 64,307.65
C. \$12,915.01
D. \$12,914.02
15. If the value of stock in a company increases by 3.5% each year, what is the rate you would use as the base in an exponential function?
- A. 3.5
B. 1.35
C. 1.035
D. 0.965
16. A town grows at an annual rate of 10% and the population is initially 5,000. Which formula represents this situation where the population, P , is a function of time, t , in years?
- A. $P = 5,000(0.10)^t$
B. $P = 5,000(0.90)^t$
C. $P = 5,000(1.10)^t$
D. $P = 5,000(10)0.90^t$
17. A boat is purchased for \$24,000 and depreciates at a rate of 13.5% each year. What will be the approximate worth of the boat in 5 years?
- A. \$7,800
B. \$11,600
C. 16,200
D. \$19,440
18. The following functions give the population of four towns at time t years. Which function has the largest annual growth rate?
- A. $P = 3,500(0.96)^t$
B. $P = 1,200(1.15)^t$
C. $P = 4,000(1.10)^t$
D. $P = 1,000(1.05)^t$
19. The population of a city was 3,381,000 in 2000 and is growing at an annual rate of 1.8%. If this growth rate continues, what will be the approximate population of the city be in the year 2006?
- A. 3,696,000
B. 3,763,000
C. 3,798,000
D. 3,831,000
20. At 6% annual interest compounded yearly, a principal of \$10,000 will grow to an amount $A = 10,000(1.06)^n$, where n is the number of years. What will the amount in the account be after 8 years?
- A. \$10,600.00
B. \$14,185.19
C. \$15,938.48
D. \$84,800.00

Quadratic Equations & Exponential Functions

Goal 4.02 & 4.04

21. If an initial population of 20 single celled algae doubles every day, how many algae cells will there be in 9 days?

- A. 512
- B. 2,560
- C. 5,120
- D. 10,240

22. The city of Southport is growing at an annual rate of 9.5%. Evaluate the expression $N = (1.095)^x$ for $x = 8$ to estimate how many times the current population the new population N will be in 8 years if this growth rate continues.

- A. 8 times
- B. 1.76 times
- C. 2.07 times
- D. 2.67 times

23. A lab technician begins with 3 bacteria in a petri dish. Every hour, the number of bacteria doubles. Use a graph of $y = (3)2^x$, where x is the number of hours and y is the number of bacteria, to find about how long it will take for the dish to contain more than 100 bacteria.

- A. 4.4 hours
- B. 5.1 hours
- C. 6 hours
- D. 6.5 hours

24. The population of a city is 32,500. The population is increasing at a rate of 2.5% each year. What is the population of the city after 6 years?

- A. 35,874 residents
- B. 36,771 residents
- C. 37,690 residents
- D. 38,632 residents

25. Iodine-131 has a half life of about 8 days. About how much of a 10 gram sample will be left after 384 days?

- A. 2.96×10^{-6} grams
- B. 5.64×10^{-10} grams
- C. 3.55×10^{-14} grams
- D. 6.04×10^{-18} grams

26. Melinda found 12 shells during her first year of shell collecting. Each year, she is going to find twice as many shells as she found the previous year. How many shells will Melinda find in her fifth year?

- A. 24
- B. 48
- C. 96
- D. 192

27. The following table of values shows solutions to which equation?

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{256}$	$\frac{-1}{32}$	$\frac{1}{4}$	-2	16	-128	1,024

- A. $y = 2\left(\frac{1}{8}\right)^x$
- B. $y = 2(-8)^x$
- C. $y = -2\left(\frac{1}{8}\right)^x$
- D. $y = -2(-8)^x$

Quadratic Equations & Exponential Functions

Goal 4.02 & 4.04

28. Suppose a ball is dropped from a height of 6 meters and bounces to 90% of its previous height after each bounce. Using the formula $h = 6(0.9)^n$, where n represents the number of bounces and h represents the maximum height of the ball after the n th bounce, what is the approximate maximum height of the ball after the 12th bounce?

- A. 1.37 meters
- B. 1.53 meters
- C. 1.69 meters
- D. 1.88 meters

29. The number of cell phones, y (in thousands), from 1985 to 1995 can be modeled using the equation $y = 0.432(1.55)^x$, where x is the number of years after 1985. In what year were there approximately 6 thousand cell phones?

- A. 1989
- B. 1991
- C. 1993
- D. 1995

30. Cobalt-60 is used medically for radiation therapy. Cobalt-60 has a half-life of about 5.26 years. About how much of a 200 gram sample will be left after 2 years?

- A. 233.3 grams
- B. 153.7 grams
- C. 118.1 grams
- D. 32.3 grams

Markup, Discount, and Tax

Find the selling price of each item.

1) Cost of a sled: \$99.50
Markup: 95%

2) Cost of a comic book: \$3.95
Markup: 20%

3) Cost of an oil change: \$18.00
Markup: 70%

4) Cost of a CD: \$14.50
Markup: 30%

5) Cost of an MP3 player: \$129.50
Markup: 60%

6) Cost of an oil change: \$21.95
Markup: 65%

7) Cost of a pen: \$0.95
Markup: 60%

8) Cost of a computer: \$1,850.00
Markup: 75%

9) Original price of concert tickets: \$100.00
Discount: 21%

10) Original price of a book: \$18.50
Discount: 45%

11) Original price of a telescope: \$99.99
Discount: 13%

12) Original price of a CD: \$22.99
Discount: 5%

13) Original price of a sled: \$99.50
Discount: 50%

14) Original price of a camera: \$554.99
Discount: 48%

15) Original price of a CD: \$17.00
Discount: 50%

16) Original price of a CD: \$22.95
Discount: 10%

17) Original price of a book: \$49.95
Tax: 3%

18) Original price of a book: \$90.50
Tax: 4%

19) Original price of an MP3 player: \$99.50
Tax: 4%

20) Original price of a microphone: \$129.99
Tax: 1%

21) Original price of a pen: \$1.50
Tax: 4%

22) Original price of shorts: \$19.99
Tax: 2%

23) Original price of an SUV: \$42,000.00
Tax: 3%

24) Original price of a goldfish: \$1.50
Tax: 5%